

What is claimed is:

- 5 1. A process for the production of difluoromethane comprising:
- (a) contacting dichloromethane with hydrogen fluoride in the presence of a fluorination catalyst to produce a product stream ^{comprising} of difluoromethane, monochloromonofluoromethane, and unreacted starting materials and
- (b) separating difluoromethane from the product stream from step (a)
- 10 wherein sufficient hydrogen fluoride is employed in the process such that during step (b) the molar ratio of hydrogen fluoride to monochloromonofluoromethane is at least about 100:1.
2. A process as claimed in claim 1, in which the molar ratio of hydrogen
- 15 fluoride to monochloromonofluoromethane is at least about 150:1.
3. A process as claimed in claim 1 in which additional hydrogen fluoride is added to the process stream recovered from step (a) in order to ensure that the required ratio of hydrogen fluoride to HCFC-31 is achieved during step (b).
- 20 4. A process for the production of difluoromethane comprising (a) contacting dichloromethane with hydrogen fluoride in the presence of a fluorination catalyst to produce a product stream comprising difluoromethane, monochloromonofluoromethane and unreacted starting materials, (b) separating
- 25 difluoromethane from the product stream from step (a) and (c) recovering difluoromethane and recycling HCFC-31 to step (a) wherein sufficient hydrogen fluoride is employed in the process such that during step (b) the molar ratio of hydrogen fluoride to monochloromonofluoromethane is at least about 100:1.

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5. A process as claimed in any one of claims 1 to 4 in which the separation step (b) comprises distilling the product stream from step (a) whereby to separate a top stream comprising difluoromethane and hydrogen chloride from a bottom stream comprising hydrogen fluoride, HCFC-31 and unreacted dichloromethane.

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6. A process as claimed in ^{claim} ~~any one of claims 1 to 5~~ in which the fluorination catalyst comprises a metal oxide, metal fluoride or oxyfluoride.

7. A process as claimed in claim 6 in which the metal of the oxide, fluoride, or oxyfluoride is at least one of chromium, aluminum, zinc, nickel, cobalt, copper and magnesium.

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8. A process as claimed in claim 7 in which the catalyst comprises zinc or a compound of zinc and a metal oxide, fluoride or oxyfluoride in which the metal of the oxide, fluoride or oxyfluoride is chromium or aluminum.

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9. A process for producing difluoromethane comprising the steps of:

(A) preheating a composition comprising hydrogen fluoride and dichloromethane to form a vaporized and superheated composition;

(B) reacting the preheated composition of step (A) in the presence of a fluorination catalyst under conditions suitable to form a product stream comprising difluoromethane, chlorofluoromethane, hydrogen chloride, dichloromethane and hydrogen fluoride;

(C) recovering by distillation from the product stream of step (B) a high boiling fraction comprising hydrogen fluoride, dichloromethane, and chlorofluoromethane and a low boiling fraction comprising difluoromethane, hydrogen chloride, hydrogen fluoride, and reaction byproducts; and

(D) recovering substantially pure difluoromethane from the low boiling fraction of step (C).

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10. The process of claim 9 wherein the hydrogen fluoride and dichloromethane are present in a mole ratio of from about 1:1 to about 10:1. ✓

5 11. The process of claim 9 wherein the composition of step (A) further comprises chlorofluoromethane. ✓

12. The process of claims 9 or 11 wherein the hydrogen fluoride and the chlorofluoromethane are present in the product stream in a mole ratio of at least
10 about 25:1 to at least about 300:1. ✓

13. The process of claims 9 or 11 wherein the hydrogen fluoride and the chlorofluoromethane are present in the product stream in a mole ratio of at least
15 about 50:1 to at least about 200:1. ✓

14. The process of claims 9 or 11 wherein the hydrogen fluoride and the chlorofluoromethane are present in the product stream in a mole ratio of at least
about 75:1 to at least about 150:1.

20 15. The process of claims 1 or 9 wherein the fluorination catalyst is a pretreated fluorination catalyst ✓

16. The process of claims 1, 9 or 15 wherein the fluorination catalyst is chromium oxide. ✓

25 17. The process of claim 9 wherein the high boiling fraction of step (C) is recycled to step (A). ✓

18. The process of claim 9 wherein step (D) further comprises the substeps of:

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(E) treating the low boiling mixture of step (C) in an HCl distillation column or an aqueous HCl absorption tower under conditions suitable to remove HCl and trace HF to form a crude HFC-32 product;

5 (F) treating the crude HFC-32 product formed in step (E) with a first caustic scrubber under conditions suitable to form a neutralized product;

(G) treating the neutralized product of step (F) in a second caustic scrubber under conditions suitable to form a substantially chlorine-free product;

10 (H) treating the substantially chlorine-free product of step (G) with a sulfuric acid scrubber and subsequently with a solid desiccant to form a substantially moisture-free product; and

(I) distilling the substantially moisture-free product of step (H) under conditions suitable to produce substantially pure difluoromethane.

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